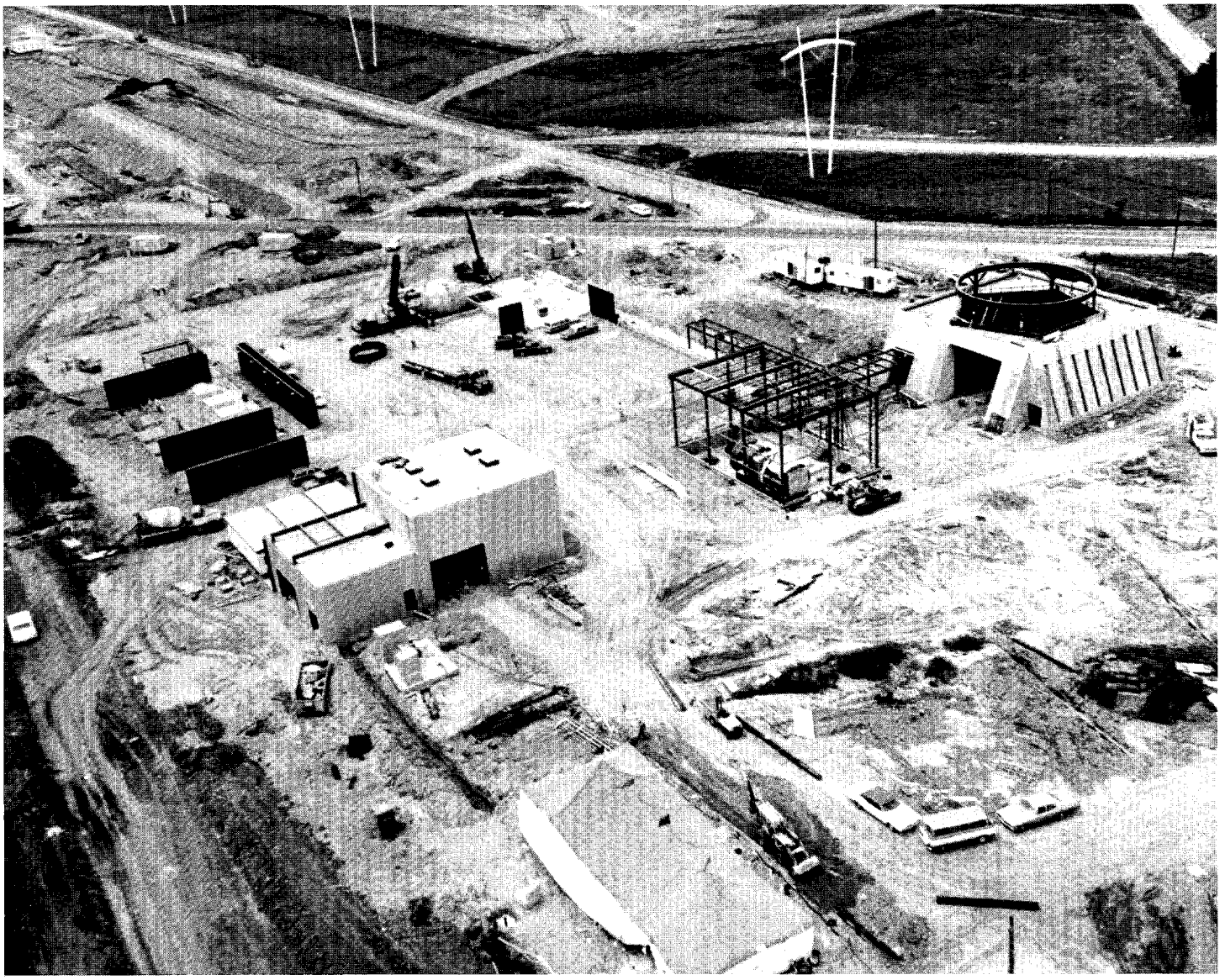
national accelerator laboratory FERMILAB-NAL-060
0090.01

MONTHLY REPORT OF ACTIVITIES

August 1, 1971



THE NEUTRINO LABORATORY

Operated by Universities Research Association Inc. Under Contract with the United States Atomic Energy Commission

FORTHCOMING MEETING AT THE LABORATORY

Program Advisory Committee	August 7-13 (at Aspen West)

THE COVER: The bubble-chamber area of the Neutrino Laboratory from the air. At the far right is Building A (see also Fig. 5). To its left is Building C (see also Fig. 2). The vacuum sphere of the 15-foot chamber can be seen in the foundations of Building B. Nearest us is a tent used for storage, Building D for the 30-inch chamber (see also Fig. 6), and, beyond, the beginning of the Compressor Building.

NAL-60
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MONTHLY REPORT OF ACTIVITIES

F. T. Cole

August 1, 1971

Abstract: This report summarizes the activities of the National Accelerator Laboratory in July, 1971.

Main Accelerator

A number of problems in the main accelerator were uncovered and solved during July. Aside from the kinked beam pipe mentioned in last month's report, a partially collapsed vacuum chamber was found in a magnet. A piece of scrap copper tubing was discovered to be shorting out two turns of a coil. The 8 turns of beam at the end of June came in spite of these problems.

With these cured, much better beam has been achieved. At 2:30 a.m. on the morning of August 1, a first circulating beam was observed. It was rapidly built up to over 10,000 turns. It is expected that initial acceleration tests can now begin. The high-vacuum system is also in operation, and the pressure in the main-ring chamber is now approximately 10^{-7} torr, the design value.

Fifteen of the main-ring accelerator rf cavities are in place of which 5 have been in operation; the limitation is in the anode power-supply transformers supplied for the main accelerator and booster by the fabricator of the anode power-supply systems. Two of these transformers have failed in the booster; while they are being repaired, there is only one left for main-ring service.

Injector

The linac and booster have delivered 7-GeV beam to the main accelerator in July at times with an efficiency of about 50%, a figure we consider reasonable for such new accelerators. It is now possible to accelerate beam with only 13 booster rf cavities operating. The booster has accelerated as much as 12 milliamperes, but there are still beam losses that need to be reduced, particularly in the region of straight-section 9, where there is some as-yet-mysterious difficulty.

Meson Laboratory

Installation of components has begun. Three beam-line dipoles are in place and are partially surveyed and under vacuum. Utilities installation for the first experiments is approximately 90% complete. Apparatus for Experiment 4A is partially in place in Enclosure M3. Figure 1 shows the interior of the target area.

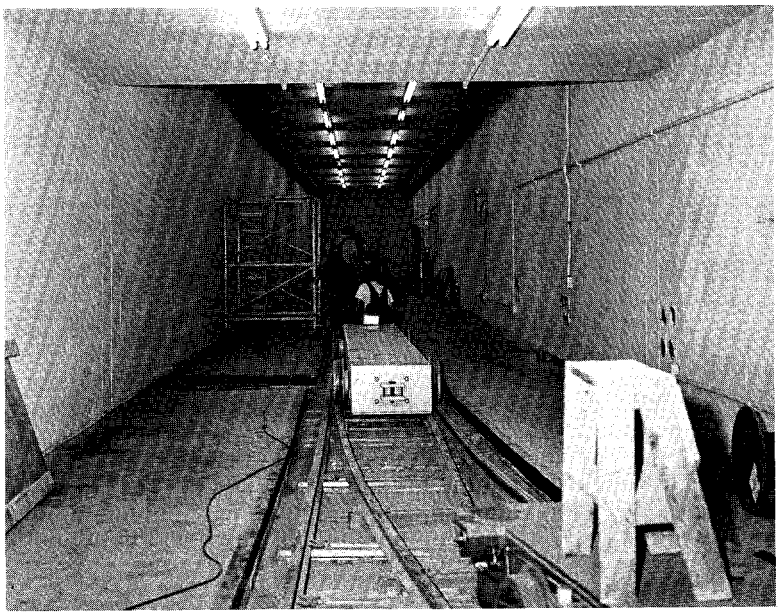

Fig. 1. Interior of the Meson Laboratory target area. The railroad for target elements is in the foreground.

Neutrino Laboratory

The meson-decay pipe and the first section of the hadron-beam pipe are complete and vacuum-checked. Magnets and power supplies are arriving and being tested.

Experiment 21 is in place in the beam line and Experiment 1A is being assembled in Building C, just beyond the large bubble chamber, as seen in Fig. 2. Experiment 26, which will go into the Muon Laboratory along the neutrino-beam line, is being assembled in one of the Industrial Buildings, as seen in Fig. 3.

Fig. 2. Magnets and detectors of Experiment 1A being fabricated inside the framing of Building C, the counter building.

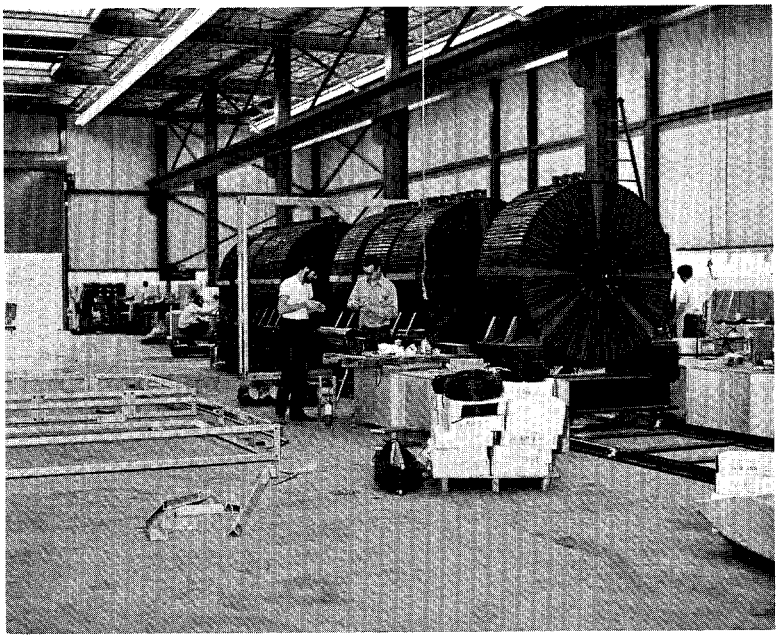

Fig. 3. David Chapman of Michigan State University and Steven Herb of Cornell University working on apparatus for Experiment 26. Behind them are the magnets of the experiment, which are mounted on a rail system in order to change momentum quickly.

Construction

1. Proton Beam Enclosure. Final cleaning up and seeding of earth berms is in progress. This contract is 97% complete and will be finished in August.

2. Neutrino Laboratory. The target area has only mechanical, electrical, and clean-up work left and will be complete soon. The shielding berm is shown in Fig. 4. The decay-region contract is 43% complete. The decay pipe is vacuum tight. At the far end the contract for the bubble-chamber buildings is 55% complete. Erection of the dome of the assembly-building, which is shown on the cover and in Fig. 5, will begin in August. The steel framing of Building C is up, as seen in Fig. 2. The 30-inch bubble chamber is being installed in Building D, shown in Fig. 6.

Fig. 4. Shielding berm over the Neutrino Laboratory target area and decay region (with 6-foot human present for scaling).

Fig. 5. Interior of the Bubble-Chamber Assembly Building. The man at the top is working on the circular crane rails. The dome of this building will be constructed of panels of used cans between fiberglass sheets.

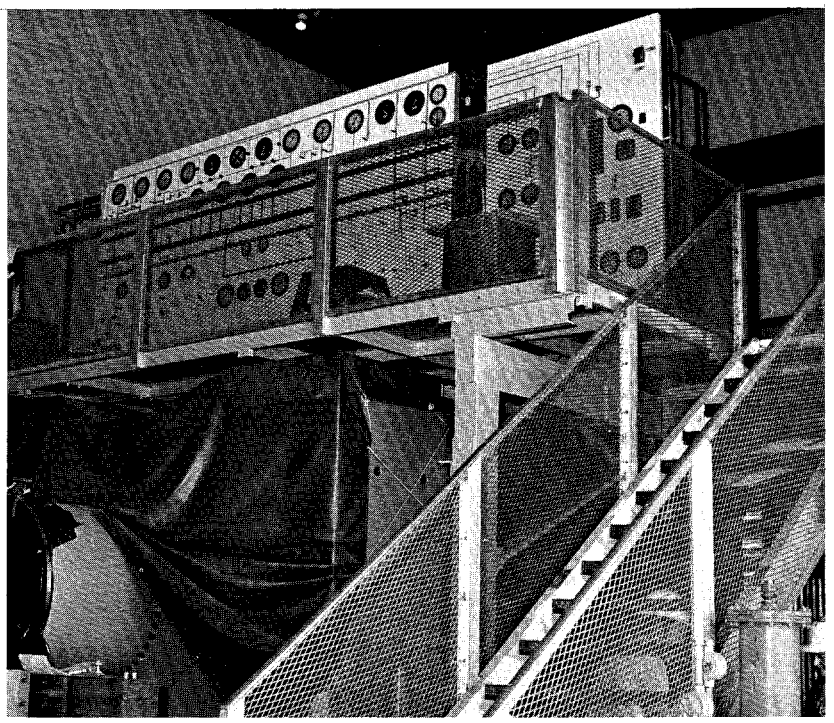

Fig. 6. The 30-inch chamber being installed in Building D.

3. Meson Laboratory. The target area is 82% complete and backfill is being placed over it. The steel framing of the mezzanine of the Detector Building has been erected, and the pits beyond it for experiments are two-thirds excavated. Figure 7 is an aerial view. The secondary-beam line contract between the target and Detector Building is 91% complete. This work is shown in Fig. 8.

4. Proton Laboratory. The first phase, let in June, has completed excavation and piling work and is about to begin concrete placement. Contracts for three additional phases have been let in July, one for $431,000 to the Herlihy Mid-Continent Company for work up to the target, one for $224,750 to the Schless Construction Company, and one for $572,520 to the Kaiser-Ducett Company for work beyond the target. Over 200 feet of base slab have been

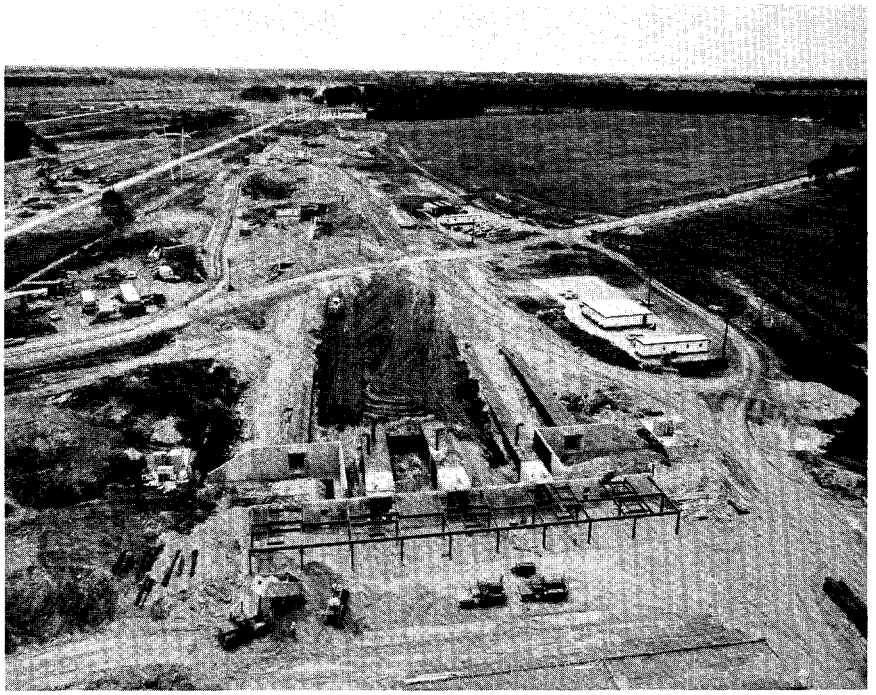

Fig. 7. Aerial view of the detector area of the Meson Laboratory. The steel framing of the mezzanine of the Detector Building is in the foreground and the secondary-beam lines upstream of it are beyond.

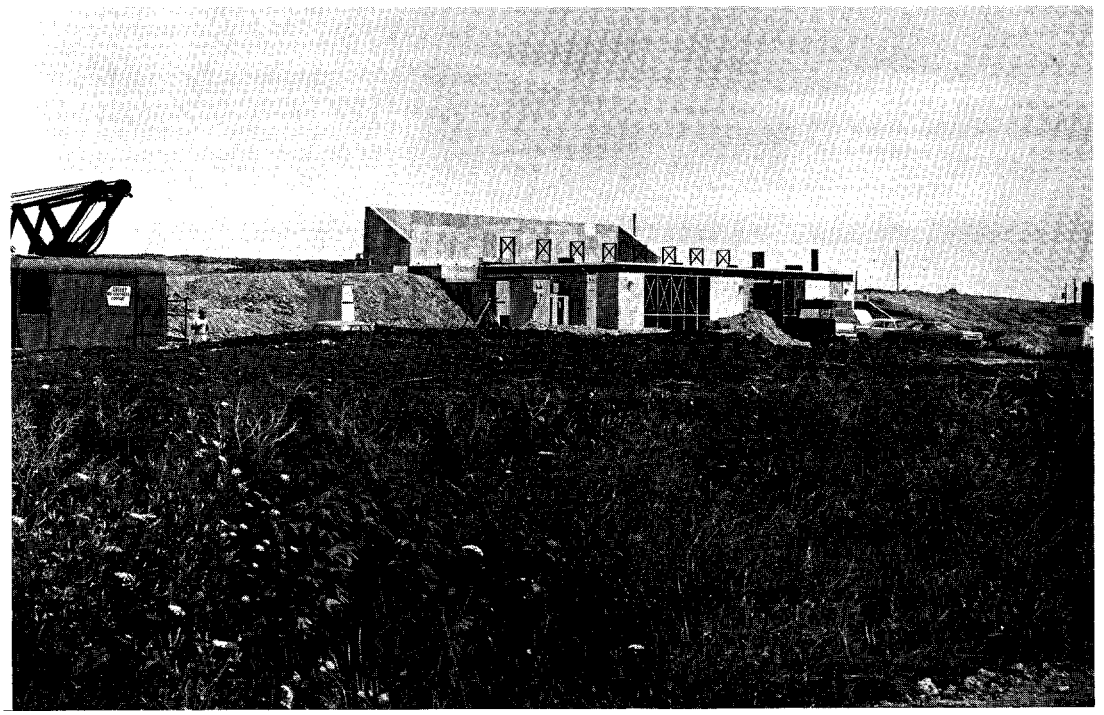

Fig. 8. Secondary-beam lines of the Meson Laboratory with a service building in the center.

placed by Herlihy and Schless and Kaiser-Ducett have started excavation. This work is seen in Fig. 9.

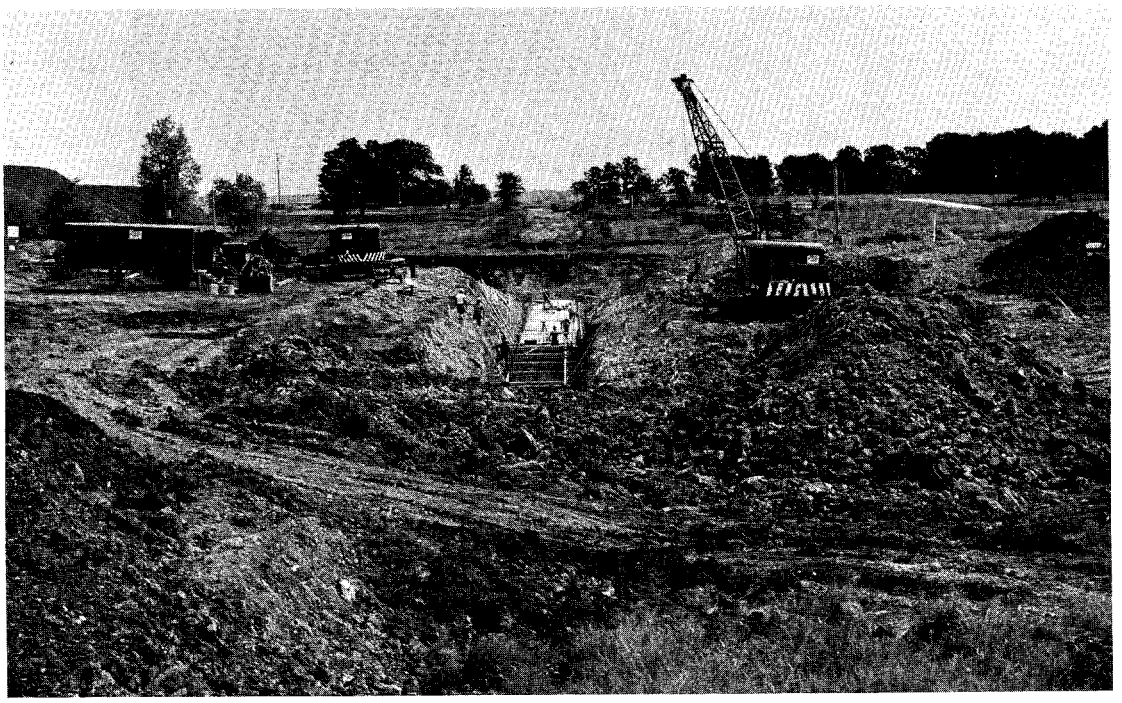

Fig. 9. Some of the first construction of the Proton Laboratory. This photograph is taken from Road B, near the electrical Substation, looking in the beam direction. The shielding berm of the Neutrino Laboratory is at the left.

5. Central Laboratory. The final phase, which is for the ground-level floor, is 76% complete. The roof deck has been completed. Partial occupancy for installation of a much-needed temporary cafeteria will begin in August.

APPENDIX. ADDITIONAL PROPOSALS RECEIVED

133. Study of Multipion Production in High Energy $\pi^- p$ Interactions at NAL Using the 30-Inch Hydrogen Bubble Chamber and a Wide-Gap Spark Chamber Spectrometer

N. N. Biswas, N. M. Cason, V. P. Kenney, J. A. Poirier, C. A. Rey, O. R. Sander, W. D. Shephard, and D. W. Thomas

134. Study of Multipion Production in High Energy $\pi^- p$ Interactions at NAL

N. N. Biswas, N. M. Cason, V. P. Kenney, W. D. Shephard, and D. W. Thomas

135. Proposal for an Experiment to Study the Reaction $K^- p \rightarrow \bar{K}^0 n$ at NAL Energies

T. L. Jenkins, W. M. Smith, A. G. Strelzoff, C. R. Sullivan, D. H. Miller, S. L. Meyer, G. Hicks, and D. Freytag

136. A Study of High Energy π - Nucleon Collisions

D. Carpenter, L. Fortney, C. Rose, W. D. Walker, A. W. Key, J. D. Prentice, E. C. West, T. S. Yoon, A. R. Erwin, and M. A. Thompson

137. Study of $\pi^- + p$ Interactions at High Energy

F. R. Huson, S. Pruss, B. Daugeras, G. Goldhaber, H. H. Bingham, and W. B. Fretter

138. Study of Multiparticle Production in a 30-Inch Bubble Chamber

J. Chapman, J. Lys, H. Ring, B. Roe, D. Sinclair, J. VanderVelde, C. Bromberg, D. Cohen, T. Ferbel, P. Slattery, S. Stone, and B. Werner

139. A Measurement of the Electromagnetic Radius of the Kaon and the Difference Between the Pion and Kaon Radii

W. Cleland, E. Engels, D. Lowenstein, and H. Scribner

140. Proposal to Study High Mass States of $\pi^{\pm}$, $K^{\pm}$ and $p^{\pm}$ with Masses Up to 10 GeV

D. Bowen, D. Earles, W. Faissler, D. Garelick, M. Gettner, B. Gottschalk, G. Lutz, E. Shibata, E. von Goeler, and R. Weinstein

141. Study of pp Interactions in the ANL 30-Inch Hydrogen Bubble Chamber at NAL

G. Charlton, Y. Cho, M. Derrick, R. Engelmann, T. Fields, L. G. Hyman, B. Musgrave, L. Voyvodic, R. J. Walker, H. Yuta, Z. Ming Ma, and B. Kehoe

142. Proposal for a Search for Superheavy Elements by Irradiations at NAL

J. Halperin, O. L. Keller, R. L. Macklin, H. W. Schmitt, R. J. Silva, and R. W. Stoughton

143. Proposal for a Rapid Systematic Study of All Interactions in a π^-p Exposure of the Bare 30-Inch Chamber at 120 GeV/c

P. L. Connolly, P. V. C. Hough, G. R. Kalbfleisch, and R. C. Strand

144. Proposal to Set Up a Tagged Photon Facility to Survey Photon Induced Reactions in 50 - 300 BeV Region

B. Margolis, P. M. Patel, W. Ross, D. G. Stairs, L. Bird, C. Halliwell, R. Morrison, J. Walters, E. Coleman, T. Fesesse, Y. Makdisi, U. J. Becker, P. Biggs, M. Chen, T. Nash, H. F. W. Sadrozinski, S. C. C. Ting, S. L. Wu, and T. T. Wu

145. A Proposal to Study Photon Proton Interactions Between 20 and 250 GeV

J. K. Walker

146. A Study of Proton-Nuclei Interactions at Energies Higher Than 100 GeV with Visual Solid Detectors

R. Kaiser, J. P. Massue, R. Pfouhl, R. Schmitt, P. Cuer, G. Henig, J. U. Schott, E. Schopper, C. Rios, V. Gandia, P. S. Young, J. Hebert, and P. Demers

147. Proposal of an Experiment on the Fission of Very Heavy Nuclei Induced by 200 GeV Protons

M. Debeauvais, J. Ralarosy, G. Remy, R. Stein, J. Tripier, and J. Hebert

148. Coulomb Production of Vector Mesons

K. Ruddick, E. Peterson, M. Marshak, E. Marquit, H. Courant, and E. Coleman

149. A Survey Measurement of Charged Hyperon Fluxes, Including a Search for New Particles in the Mass Range Up to 5.5 GeV/c^2, of Proper Life-Time Larger than $3 \cdot 10^{-11}$ Seconds

T. M. Knasel, J. Lindquist, P. Linsay, R. L. Sumner, E. C. Swallow, R. Winston, T. A. Romanowski, J. M. Watson, D. M. Schwarts, and A. J. Stevens

150. Study of Two Particle Distributions in the Secondaries Produced in Proton-Proton Collisions

J. Sauer, R. Shafer, T. Collins, A. Roberts, D. Theriot, D. Carey, J. K. Walker, and J. Johnson

151. Preliminary Proposal to Study Neutrino Interactions with Neutrons and Protons Using the 15-Foot Bubble Chamber at NAL Filled with Deuterium

G. A. Snow and R. A. Burnstein

152. Proposal to Build an Electron-Photon Facility at NAL and to Measure Photon Scattering at High Energies

D. E. Dorfan, S. M. Flatte, C. A. Heusch, G. Luxton, C. del Papa, and A. Seiden

153. NAL Proposal (30" HBC) Negative Pion - Proton Interactions at 200 GeV/c

T. Kitagaki, S. Tanaka, K. Abe, K. Hasegawa, R. Sugahara, K. Tamai, H. Kichimi, T. Okusawa, and S. Noguchi